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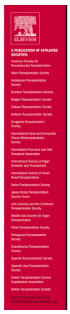

TRANSPLANTATION PROCEEDINGS

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Intra-operative post-perfusion micro-nephrolithotomy for renal allograft lithiasis: a case report.

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Abstract

Intra-operative post-perfusion micro-nephrolithotomy for renal allograft lithiasis: a case report.

Increasing demand drives the expansion of criteria for kidney donation and nephrolithiasis is now considered a relative contraindication. We report for the first time a case of intra-operative, post-perfusion kidney allograft micro-nephrolithotomy. A 64-year-old man with end-stage renal disease secondary to Alport syndrome underwent primary deceased donor kidney transplantation at our centre. Pre-operative ultrasound of the donor identified a 7-mm calculus in the anterior, lower pole calyx. The kidney was extra-peritoneally implanted in the right iliac fossa and reperfused homogenously. Stone retrieval with a flexible ureteroscope failed due to the narrow calyceal infundibulum. Instead the calculus was removed using the microperc percutaneous nephrolithotomy system under ultrasonographic guidance. The calyx was punctured using a 4.85 Fr needle and the stone was fragmented to dust using a Holmium laser. No bleeding was observed. The post-operative course was uneventful. Outpatient follow up demonstrated good function of the graft which was stone free on ultrasound. Post-perfusion microperc nephrolithotomy for kidney allograft calculi offers a safe and feasible option when pre-operative or intra-operative retrograde intra-renal surgery fail.

Introduction

Persistent shortages of allografts have compelled transplant teams to widen criteria for organ donation. Historically, renal calculi were considered an absolute contraindication. However, with the increased detection of small, asymptomatic stones in functionally normal kidneys, there has been increasing recognition that renal calculi should be seen only as a relative contraindication. Improving experience in managing donor lithiasis is reflected in the variety of approaches applied to its management. [1] Miniaturized percutaneous nephrolithotomy (PCNL) such as the microperc system is increasingly being used to treat nephrolithiasis. [2] The procedure is generally performed under ultrasonography using a three components 4.85 Fr all-seeing needle. The three-way port allows to simultaneously introduce a fiber optic device, a laser fiber, and an irrigation system. The main indication for miniaturized PCNL is solitary lithiasis of the kidney with low-density stones less than 1000 mm^3 in volume. [3] Nevertheless, successful treatment of ureteral, bladder, and urethral calculi has been recently reported. [4]

We herein describe for the first time a case of successful intra-operative, post-perfusion allograft micro-nephrolithotomy.

Case report.

A 64-year-old man with end-stage renal disease secondary to Alport syndrome was admitted for a primary deceased donor kidney transplant on March 2017. Pre-transplant comorbidities included hypertension, chronic gastritis, and secondary hyperparathyroidism. The donor was a 78-year-old male who died from spontaneous intracranial hemorrhage (expanded criteria donation after brain death donor). A routine ultrasound scan performed before the organ procurement showed a 7-mm stone in the anterior, lower pole calyx (Figure 1). Ante mortem serum creatinine concentration was 1.2 mg/dL with undetectable proteinuria. Organ procurement was uneventful with a warm ischemia time of 2 minutes. The allograft was preserved on static cold storage (Celsior “organ preservation solution”,

Institut Georges Lopez, Lissieu, France) with a cold ischemia time of 12 hours and 40 minutes. The kidney was large-sized, had one artery, one vein, and one ureter. The donor and the recipient were blood group compatible and had a 5 HLA antigen mismatch. Highest recipient panel reactivity antibody was 0%. Flow and direct microcytotoxicity cross-match were negative. The graft was extra-peritoneally positioned in the right iliac fossa. The renal vein was anastomosed end-to-side to the common iliac vein and the renal artery was anastomosed side-to-end to the external iliac artery with two 5/0 prolene running sutures. After unclamping, the kidney reperfused slowly but homogenously. At this stage, stone retrieval was attempted with flexible ureteroscopy. However, the calyceal infundibulum was too narrow to accommodate the ureteroscope and the procedure was abandoned. Instead a microperc PCNL set was used to remove the calculus (Polydiagnost GmbH, Hallbergmoos, Germany). Under ultrasound guidance (Figure 2), the calyx was punctured using a 4.85 Fr needle and a tract was developed (Figure 3). The stone was visualized and fragmented to dust using a Holmium laser (Figure 4). No bleeding was observed at the puncture site. The lithotripsy took 35 minutes with no immediate complications (Supporting video 1). A double JJ 6 Fr ureteral stent was placed and the transplant ureter anastomosed to the bladder according to the Lich-Gregoire technique using 5/0 PDS sutures. The entire procedure took 240 minutes and the intra-operative blood loss was 100mL. Immunosuppression consisted of anti-thymocyte globulin (Thymoglobulin, Sanofi-Aventis Canada Inc., Quebec, Canada), tacrolimus (Adoport, Sandoz International GmbH, Holzkirchen, Germany), mycophenolate mofetil (Myfenax, Teva B.V., Haarlem, Netherlands), and steroid. The post-operative course was uneventful. The recipient was discharged after 9 days with no haematuria and improving graft function. The stent was easily removed by flexible cystoscopy on post-operative day 30. Outpatient follow up on day 44 demonstrated good graft function with ultrasound confirming the absence of allograft lithiasis.

Discussion

Given the high demands on limited supplies, the drive to extend the potential donor pool has been a key challenge facing transplant surgeons. Although recurrent stone formers and patients with metabolic stone diseases are still considered not suitable for donation, there is now a significant body of evidence to support the transplantation of renal allografts found to have calculi. [5]

Most of the time, small stones (< 4 mm) can safely be left in situ and followed up with ultrasound for early signs of complications. [5] For calculi that require intervention a number of options are available. Direct nephrotomy with stone removal and parenchymal suture represents the traditional approach. A two-stage procedure can be employed whereby retrograde intra-renal surgery (RIRS) or shockwave lithotripsy is used to render the graft stone free before transplantation. [6] Recent data have shown that single-stage procedures can be equally effective. Most commonly, ex vivo RIRS is performed and stones either removed directly using a basket or fragmented with laser lithotripsy. [7-9] The technique appears safe with a good success rate but a number of failed attempts at RIRS have been reported. In the majority of cases, surgeons proceeded to transplantation with the stone in situ. [7,9,10]

Despite the evidence that small stones may not necessarily affect graft function or jeopardize outcome, the risk of stone-related complications in transplant recipients should not be underestimated. Denervated allografts may not present with classic renal colic rather less specific signs of reduced urine output, rising creatinine or hydronephrosis. Immunosuppressed patients are also more susceptible to infections than general population and treatment options may be often limited by comorbidities, sub-optimal renal function or drug-related side effects. Furthermore, should a calculus within a graft require intervention at a later stage, access to a transplant ureter is much more difficult. As a result, it can be argued that all attempts should be made to render the allograft stone free before implantation.

Compared to standard nephrotomy, the micro-nephrolithotomy technique herein described allows to reduce the risk of bleeding, urinary leakage, and scarring. It also offers a further minimally invasive approach in those patients in whom RIRS is not possible or has failed.

Stone removal by RIRS or nephrotomy in a kidney allograft is generally performed ex vivo, under cold preservation. Even though, there are no studies comparing pre-operative and intra-operative stone removal techniques in kidney transplantation, it is common opinion that ex vivo procedures are easier and potentially safer than their in vivo counterparts. In this particular situation, we opted for post-perfusion stone removal because we did not want to excessively extend cold ischemia time, already over 12 hours. It is well known that cold ischemia time has a detrimental impact on graft outcomes and this is particularly true for fast track, expanded criteria, and donation after circulatory death kidneys. [11] At the time we benched the organ, there were no Urologists available to attempt RIRS as they were in theatre for an emergency operation. Rather than leaving the stone in situ or further increasing cold ischemia time, we preferred to proceed with the transplant and remove the stone after reperfusion. The micro-nephrolithotomy was not planned in advance but it was proposed by Urologists after RIRS failure. As far as we know, there are no reports describing such a procedure in a transplant peri-operative setting neither ex vivo nor in vivo. It may be certainly argued that in vivo techniques can be more challenging. However, they may also offer several theoretical advantages such as prompt assessment of any intra-renal injury and avoidance of unnecessary manipulation of the kidney. [12]

Our report demonstrates the feasibility of intra-operative, post-perfusion micro-nephrolithotomy for renal allograft stone removal. Such an encouraging result in vivo may serve as a basis for further investigation both in vivo and ex vivo.

Conflict of interest statement

The authors have no financial or personal relationships with other people or organizations that could inappropriately influence (bias) their work. The procedure described in the present paper did not require ethical approval. The present work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki). Written informed consent was obtained from the patient for publication of this case report and accompanying images. This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Authors' contributions

Evaldo Favi: providing conception and design, drafting the article, administrative support.

Nicholas Raison: providing conception and design, drafting the article, technical support.

Stefano Zanetti: data acquisition, data analysis and interpretation, material support.

Gianluca Sampogna: data acquisition, data analysis and interpretation, material support.

Emanuele Montanari: providing conception and design, revising the article for important intellectual content, technical support.

Mariano Ferraresso: providing conception and design, revising the article for important intellectual content, technical support.

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Figure 1. Renal ultrasound of the donor demonstrating a 7-mm calculus in the anterior, lower pole calyx.

Figure 2. Ultrasound-guided puncture of the anterior, lower pole calyx of the transplanted kidney.

Figure 3. Puncture of the anterior, lower pole calyx of the transplanted kidney.

Figure 4. Micro-nephrolithotomy Holmium laser fragmentation of the calculus.

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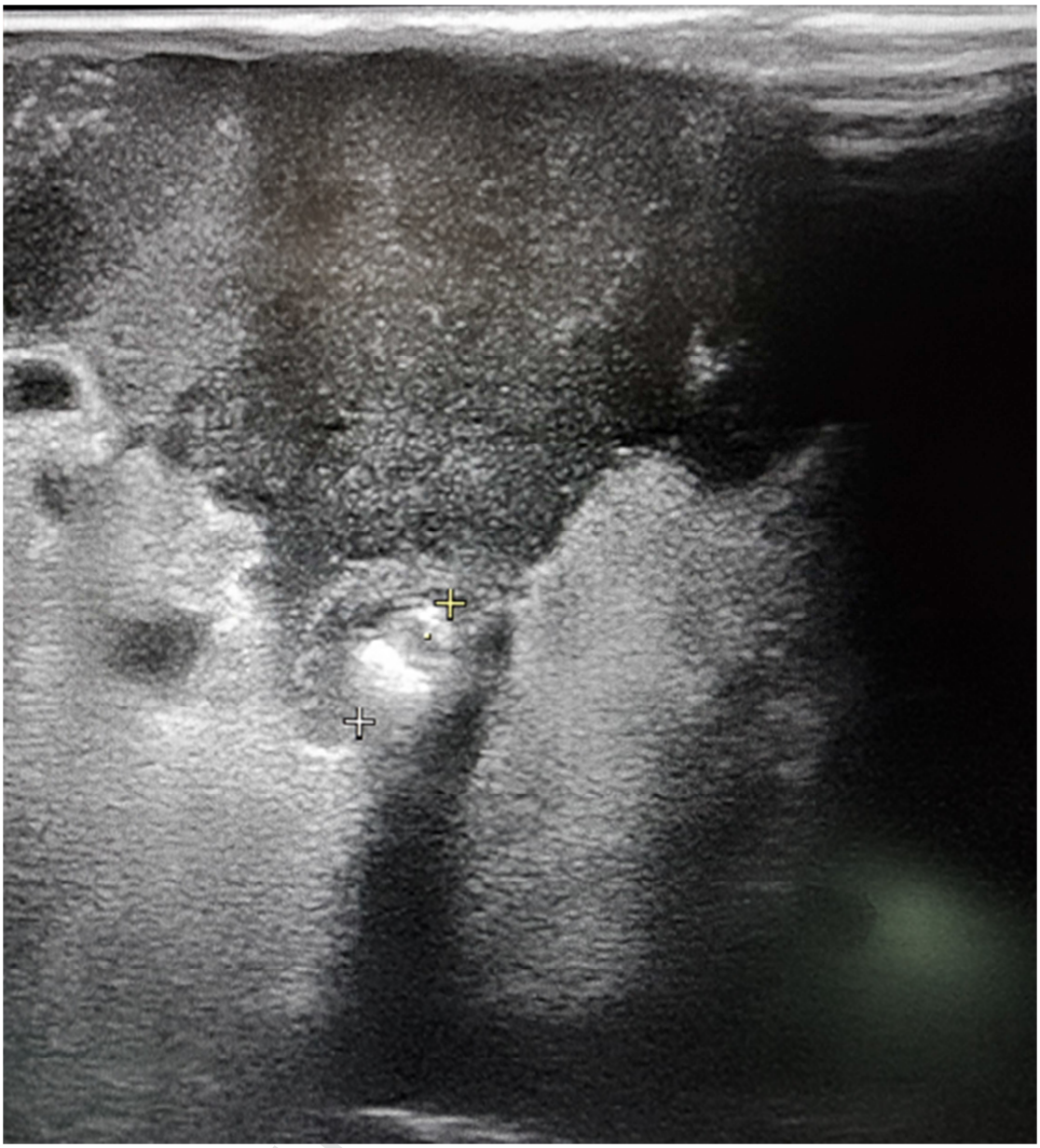

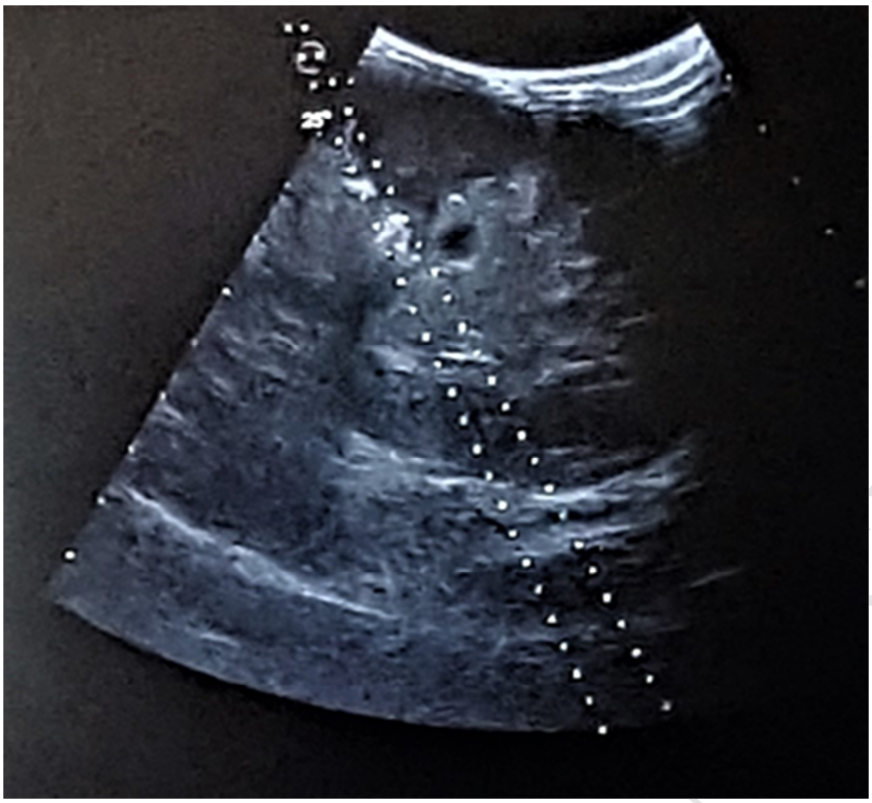

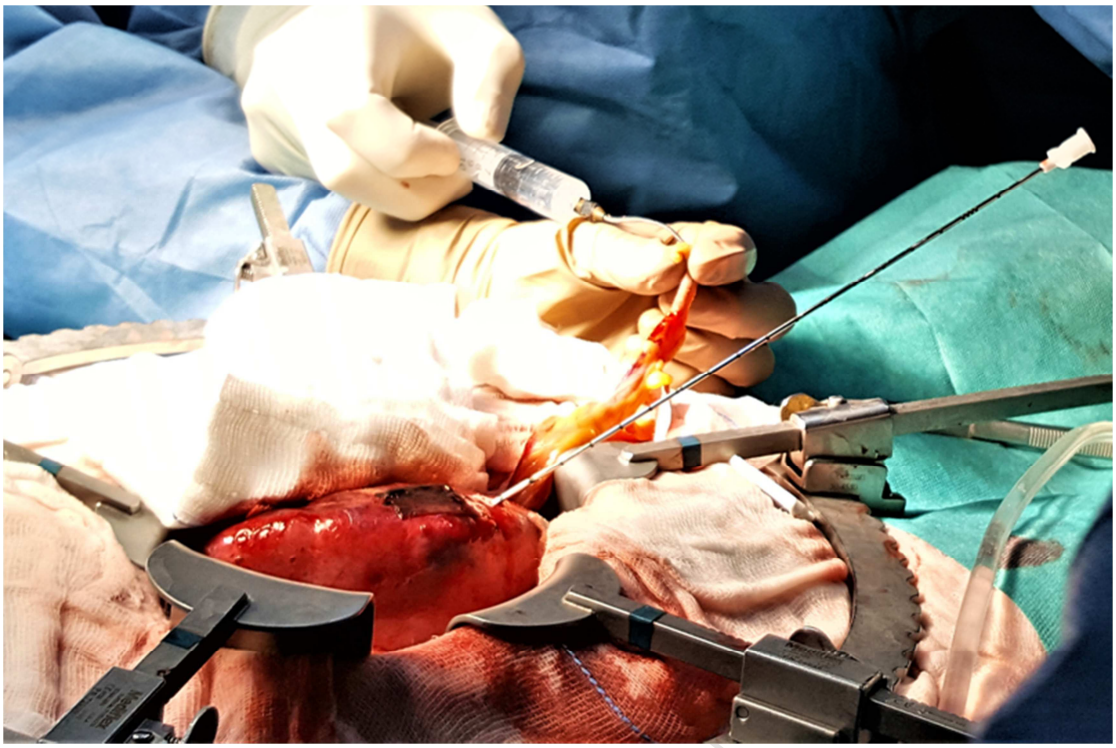

- Micro-nephrolithotomy is a valid minimally invasive technique for stone treatment
- Micro-nephrolithotomy during the transplant procedure may offer several advantages
- We report for the first time intra-operative post-perfusion micro-nephrolithotomy